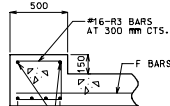


SECTION A-A



GENERAL NOTES:

ALL DIMENSIONS SHOWN ARE IN MM UNLESS OTHERWISE NOTED.

FOR DIMENSIONS AND SIZE AND SPACING OF REINFORCING STEEL, SEE STANDARD SHEET M703.15.

LAP ALL LONGITUDINAL BARS A MINIMUM OF 610 MM AT SPLICES.

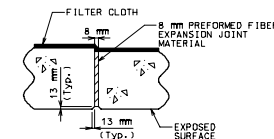
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 40 MM UNLESS OTHERWISE SHOWN.

PREFORMED FIBER EXPANSION JOINT MATERIAL SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 3.5 MM DIA. (12 GAGE) COPPER WIRE OR 2.8 MM DIA. (12 GAGE) SOFT DRAWN GALVANIZED STEEL WIRE.

BEVELED HEADWALL TO BE LOCATED AT UPSTREAM END.

A FILTER CLOTH 1 METER IN WIDTH AND DOUBLE THICKNESS SHALL BE APPLIED TO ALL TRANSVERSE JOINTS IN THE TOP SLAB AND SIDEWALLS. THE MATERIAL SHALL BE CENTERED ON THE JOINT AND THE EDGES SEALED WITH A MASTIC OR WITH TWO SIDED TAPE. THE FILTER CLOTH SHALL BE A GEOTEXTILE MEETING THE APPROVAL OF THE ENGINEER AND HAVING A GRAB TENSILE STRENGTH OF 800 N. (ASTM D-4632) AND AN APPARENT OPENING SIZE OF 300 TO 150 MICROMETERS (ASTM D-4751). COST OF FURNISHING AND INSTALLING THE FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.

FOR MORE DETAILS AND SECTION THROUGH BOX, SEE M703.13 SHEET 2 OF 3.



DETAIL OF TRANSVERSE JOINT THRU BARREL OF CULVERT

- UPSTREAM = 1050 mm
DOWNSTREAM = 1200 mm
- IF MORE THAN ONE TRANSVERSE JOINT IS REQUIRED, SEE STANDARD SHEET M703.12 FOR DETAILS.
- FOR DETAILS AND REINFORCEMENT IN WINGS, SEE STANDARD SHEET M703.37.
- USE THESE BARS FOR DESIGN FILLS OF MORE THAN 610 mm.
- USE THESE BARS FOR DESIGN FILLS OF 610 mm OR LESS.

(*** VARIES - 300 mm MAXIMUM

(****) USE TRANSVERSE JOINT WHEN BARREL IS OVER 25 METERS LONG BETWEEN HEADWALLS.

USE ADDITIONAL TRANSVERSE JOINTS TO PROVIDE 15 METERS MAXIMUM SPACING BETWEEN JOINTS.

DISTANCE BETWEEN INSIDE FACE OF HEADWALL AND TRANSVERSE JOINT SHALL NOT BE LESS THAN 1000 mm.

(*****) J4 BAR SPACING

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

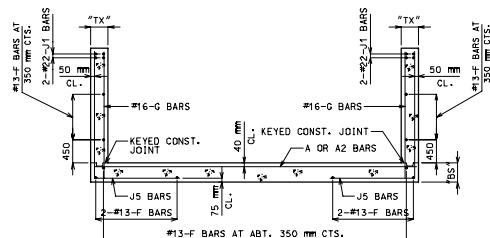
CONCRETE
SINGLE BOX STRUCTURE
STRAIGHT WINGS
(SKEWED)

DATE: _____

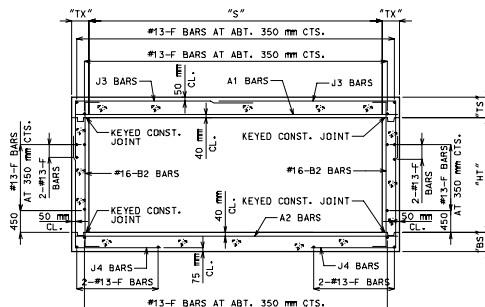
EFFECTIVE: 07-01-2004

M703.13F

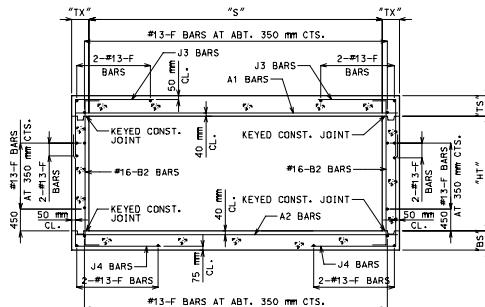
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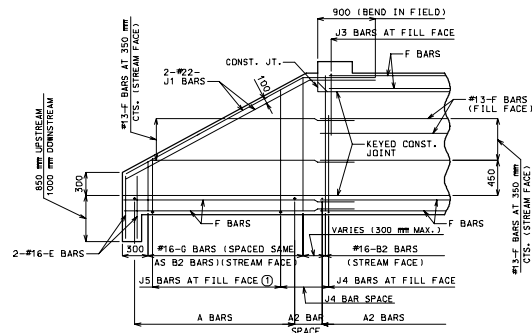
SECTION THRU WINGS



SECTION THRU BOX (DESIGN FILLS 610 mm OR LESS)



SECTION THRU BOX (DESIGN FILLS OVER 610 mm)



ELEVATION OF WING
(UPSTREAM SHOWN)

NOTE: CONSTRUCTION JOINT KEY OMITTED FOR CLARITY.

GENERAL NOTES:

ALL DIMENSIONS SHOWN ARE IN mm UNLESS OTHERWISE NOTED.

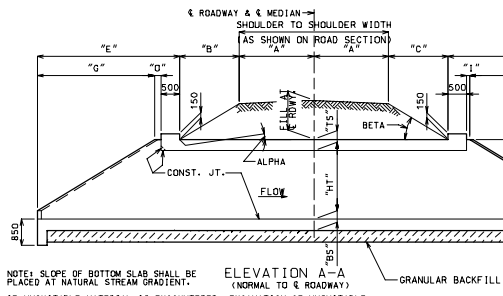
J1 BARS MAY BE BENT IN FIELD OR SHOP.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 40 mm UNLESS OTHERWISE SHOWN.

FOR DIMENSIONS AND SIZE AND SPACING OF REINFORCING STEEL, SEE STANDARD SHEET M703.15.

① FOR DETAILS OF REINFORCEMENT IN WINGS, SEE STANDARD SHEET M703.37.

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION			
CONCRETE SINGLE BOX STRUCTURE STRAIGHT WINGS (SKEWED)			
DATE: _____	EFFECTIVE: 07-01-2004	M703.13F	2 3



GENERAL DATA TABLE			
VARIABLE	DIMENSION (mm)	VARIABLE	DIMENSION (mm)
ALPHA	SEE EQUATIONS	"D"	$TX(\cos Z)$
BETA	SEE EQUATIONS	"T"	$G(\sec Z)$
"B"	SEE EQUATIONS	"V"	$HT + TS - 300$
"C"	SEE EQUATIONS	"W"	$2A + B + C + 2E$
"E"	$C + D + 500$	"X"	$TS + TX(\tan Z)$
"F"	$S + 2TX$	"Z"	SKEW ANGLE
"G"	$2V$	"BB"	$(A + B)(\sec Z)$
"H"	$(A + C + E)(\tan Z)$	"CC"	$(A + C)(\sec Z)$
"I"	$TS(\cos Z)$	"EE"	$E(\sec Z)$
"J"	$(A + B + E)(\tan Z)$	"HH"	$500(\sec Z)$
"K"	$(S/2)(\sec Z)$	"YY"	$TX(\sin Z)$
"L"	$2EE + BB + CC$		
"O"	$I + YY$		

GENERAL NOTES:

DESIGN SPECIFICATIONS:
AASHTO - 2002
LOAD FACTOR DESIGN

DESIGN UNIT STRESSES:
CLASS B-1 CONCRETE $f'_c = 28 \text{ MPa}$
REINFORCING STEEL (GRADE 420),
 $f_y = 420 \text{ MPa}$

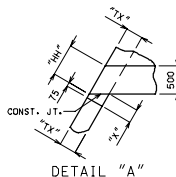
DESIGN LOADING:
EARTH 1900 kg/m^2
EQUIVALENT FLUID PRESSURE
 $4.71 \text{ kPa/m (MIN.)} - 8.42 \text{ kPa/m (MAX.)}$

ALL DIMENSIONS SHOWN ARE IN mm
UNLESS OTHERWISE NOTED.

THIS DRAWING IS NOT TO SCALE.
FOLLOW DIMENSIONS.

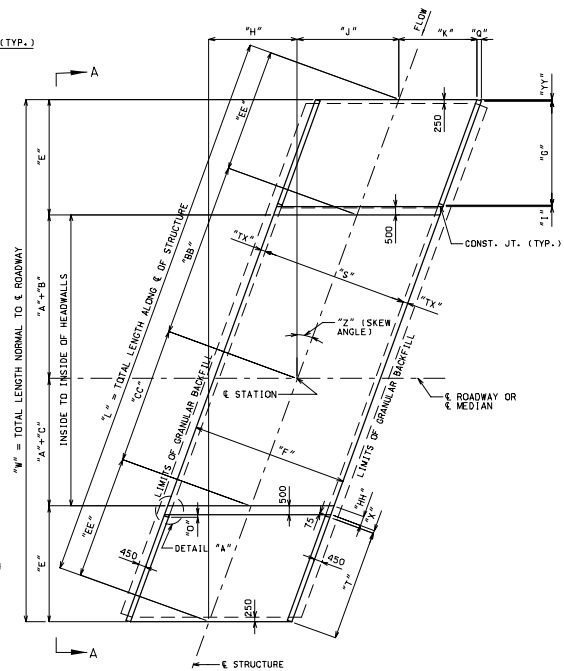
FOR DIMENSIONS NOT SHOWN, SEE
STANDARD SHEETS M703.13, SHEETS
1 & 2 OF 3 OF M703.15.

NOTE:
WHEN ALTERNATE PRECAST BOX SECTIONS ARE USED, THE MINIMUM BARREL LENGTH MEASURED ALONG THE SHORTEST WALL FROM THE FIRST JOINT TO THE OUTSIDE OF THE HEADWALL SHALL BE 300 mm. REINFORCEMENT AND DIMENSIONS FOR THE WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS DRAWINGS.



DETAIL "A"

SECTION THRU BOX
(NORMAL TO ROADWAY)



PLAN SHOWING LAYOUT DIMENSIONS
(UPSTREAM AT LEFT SHOWN FOR UPSTREAM AT RIGHT,
ROTATE 180° ABOUT ROADWAY OR MEDIAN)

EQUATIONS FOR COMPUTING LENGTH OF BARRELS

LET ALPHA = ANGLE OF SLOPE OF BARREL WITH HORIZONTAL ALONG
E OF CULVERT.

LET BETA = ANGLE OF SLOPE OF FILL NORMAL TO ROADWAY.

"B" OR "C" = $(\text{FILL AT ROADWAY}) \div (\text{CROSS-SLOPE}) \times \tan(\alpha) \div \tan(\beta)$

"B" OR "C" = HORIZONTAL DISTANCE FROM EDGE OF SHOULDER TO
HEADWALL NORMAL TO E OF ROADWAY.

DEFINITIONS

CROSS-SLOPE: SLOPE OF EACH PART OF THE ROADWAY INCLUDING
ROADWAY CROWN, SHOULDER SLOPE, AND/OR SUPERELEVATION.
SEE DESIGN ROADWAY CROSS SECTION FOR LANE AND SHOULDER
WIDTHS AND SLOPES.

MISSOURI HIGHWAY AND TRANSPORTATION
COMMISSION

CONCRETE
SINGLE BOX STRUCTURE
STRAIGHT WINGS
(SKEWED)

DATE: _____

EFFECTIVE: 07-01-2004

M703.13F

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